

PINE CUPBOARD CHEST

Resolving the construction details for a Shaker classic

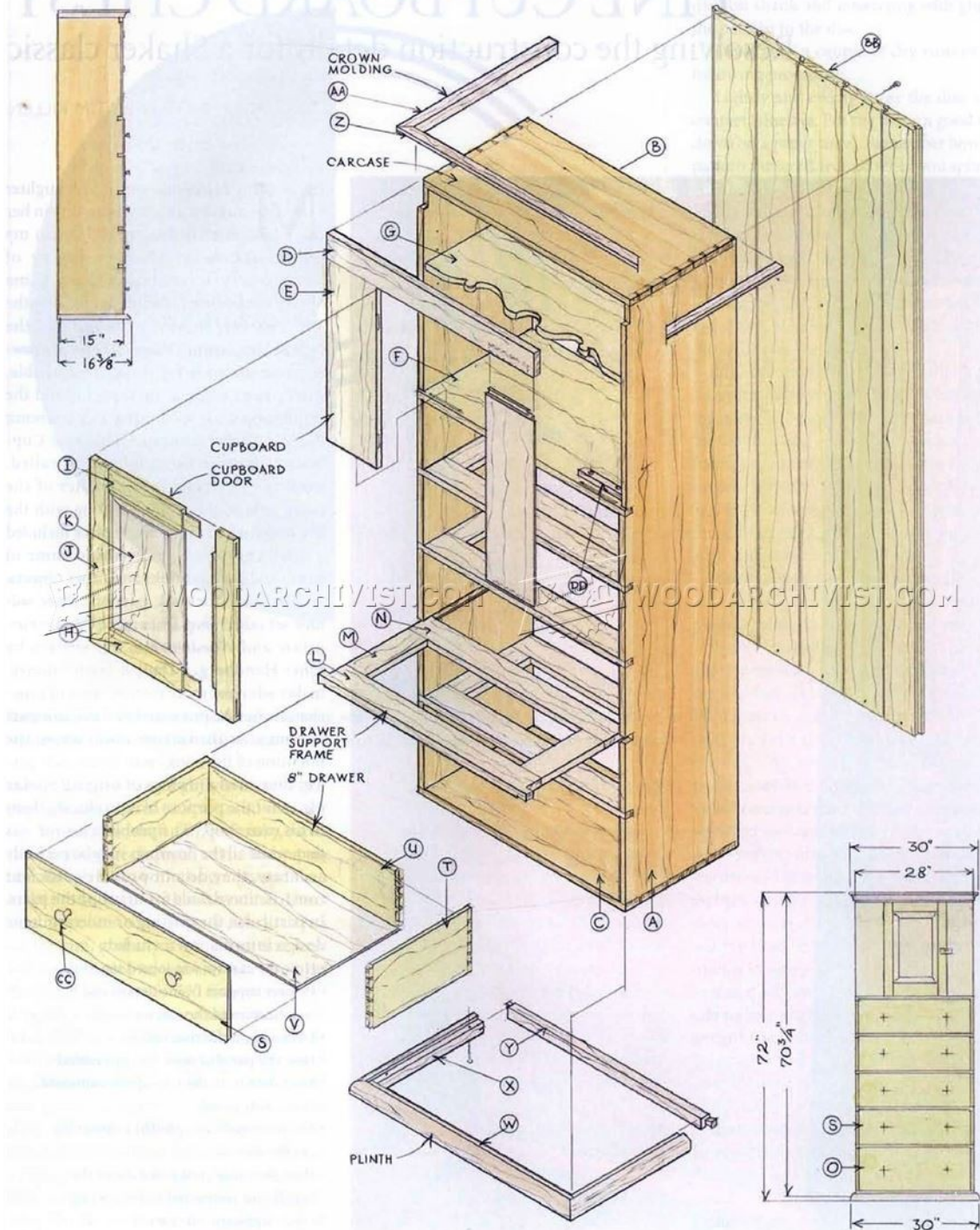
TEXT AND PHOTOS BY TIM KILLEN



My 2-1/2-year-old granddaughter needed a chest of drawers in her small bedroom, so I began my typical search for ideas—a review of numerous furniture books in my home library containing museum pieces from the 18th century. However, I found that the typical 18th century shaped chests of drawers were too wide for the space available. After expanding my research, I found the inspiration I was looking for in a reference book of Shaker furniture. This Pine Cupboard Chest, as the original was called, would fit perfectly in the corner of the room next to the window. Along with the five ample-sized drawers, the piece included a small cupboard which would come in handy for storing books and other objects.

The reference book, part of a three-volume set called *Shop Drawings of Shaker Furniture and Woodenware*, was written by Ejner Handberg, a Danish-born cabinetmaker who had more than 50 years of experience when he put together these compact volumes. As the introduction notes, the intention of the books was “to provide perfect measured drawings of original Shaker pieces for the purpose of reproducing them in his own shop.” The problem for me was that, while all the drawings may be perfectly accurate, they do not provide sufficient construction details for many of the parts. In particular, the missing or indeterminate design information included:

- How the carcass was joined together
- Drawer support frame details and connection to the carcass
- Drawer construction details
- How the paneled door was assembled
- Joint details on the two upper cupboard solid side panels
- The base molding (plinth) connection to the carcass
- How the small crest piece above the cupboard connected to the carcass and cupboard side panels
- Details on the back panel



CUT LIST

Carcase		
A-Sides	2 @	1/2" x 15" x 70 3/4"
B-Top	1 @	3/4" x 14 1/4" x 28"
C-Bottom	1 @	3/4" x 14 1/4" x 28"
Cupboard		
D-Crest Piece	1 @	3/4" x 2 1/4" x 28"
E-Side Panels	2 @	3/4" x 6 1/4" x 22 3/4"
F-Floor	1 @	3/4" x 14 1/4" x 28"
G-Adjustable Shelf	1 @	3/4" x 13 1/4" x 26 1/4"
Cupboard Door		
H-Lower Rail	1 @	3/4" x 2 1/4" x 14 1/4"
I-Upper Rail	1 @	3/4" x 2 1/4" x 14 1/4"
J-Stiles	2 @	3/4" x 2 1/4" x 21 1/4"
K-Panel	1 @	3/4" x 10" x 16 1/4"
Drawer Support Frames (4)		
L-Front Rails	4 @	3/4" x 3" x 28"
M-Side Rails	8 @	3/4" x 2 1/4" x 11 1/4"
N-Back Rail	4 @	3/4" x 2 1/4" x 27"
10" Drawer (1)		
O-Front	1 @	1/2" x 10 1/4" x 26 1/4"
P-Sides	2 @	3/4" x 10" x 14 1/4"
Q-Back	1 @	3/4" x 9 1/4" x 26 1/4"
R-Bottom	1 @	3/4" x 14 1/4" x 25 1/4"
8" Drawers (4)		
S-Front	4 @	1/2" x 8 1/4" x 26 1/4"
S-Sides	8 @	3/4" x 8" x 14 1/4"
U-Back	4 @	3/4" x 7 1/4" x 26 1/4"
V-Bottom	4 @	3/4" x 14 1/4" x 25 1/4"
Plinth		
W-Front	1 @	1 1/2" x 1 1/4" x 30"
X-Sides	2 @	1 1/2" x 1 1/4" x 16 1/4"
Y-Back	1 @	1 1/2" x 1" x 28"
Crown Molding		
Z-Front	1 @	1" x 1 1/4" x 30"
AA-Sides	2 @	1" x 1 1/4" x 16"
DD-Back Panel	1 @	3/4" x 27 1/4" x 70 3/4"
CC-Drawer Knobs	10 @	1 1/2" x 1 1/4" x 1 1/4"
DD-Door Stop	1 @	3/4" x 3/4" x 6"

These are issues frequently faced when beginning a project. Each one requires an answer at some stage of the project. Some can be postponed, but others have critical impact downstream in the construction phase. My strategy is to complete details of design in stages so that the project can proceed but not so that I get too far ahead of myself. I anticipate the steps and sequences of building the piece of furniture, and then decide the design elements needed in a sequence matching the construction.

CONSTRUCTION STAGES

The major stages of the construction of this piece, more or less in the sequence I proceeded, are:

- Carcase shaping and assembly. This includes the tall sides, the top and bottom boards, and their joinery.

- Drawer frame assembly and installation into the carcase. This includes the floor of the upper cupboard.
- Plinth assembly and fastening to the carcase.
- Cupboard side panels and crest piece fabrication and installation into the carcase.
- Crown molding construction and attaching to the carcase.
- Drawer construction and fitting to carcase.
- Cupboard door assembly, fitting of hinges, and attaching to the front opening of the carcase.
- Back panel construction and fitting to carcase.
- Drawer knob turning.
- Fabrication of adjustable shelf in cupboard.
- Final sanding and finishing.

I will briefly describe how I resolved each of these stages in the following text, but most of the details will be found in the construction drawings and the photographs I took during the construction process.

CARCASE

I selected through dovetails to join the four pieces of the carcase (1-3). I used rough 4/4 clear sugar pine stock and sized the stock to 13/16" thickness. Note that 5/16" deep dadoes are sized and positioned to hold the shelf frames and cupboard floor (3/4" thickness). The small half-dovetail joints for shelf frames were not cut until the frames were built and slid into place for marking. In addition to dovetail joints, the

two sides have cutouts for the top crest piece and the two cupboard fixed side panels. The 1/2" x 3/8" rabbets for the back panel should be cut prior to assembly of the carcase. Also, the 1/4" diameter holes for the adjustable shelf pins can be drilled in the side panels.

After testing the carcase dovetail joints, the four pieces can be glued (4). I like to use a longer setting type of PVA glue for these large difficult assemblies. Or, in many cases I will select a hot hide glue. After assembly, carefully check the diagonal dimensions to ensure squareness.

DRAWER FRAMES AND CUPBOARD FLOOR

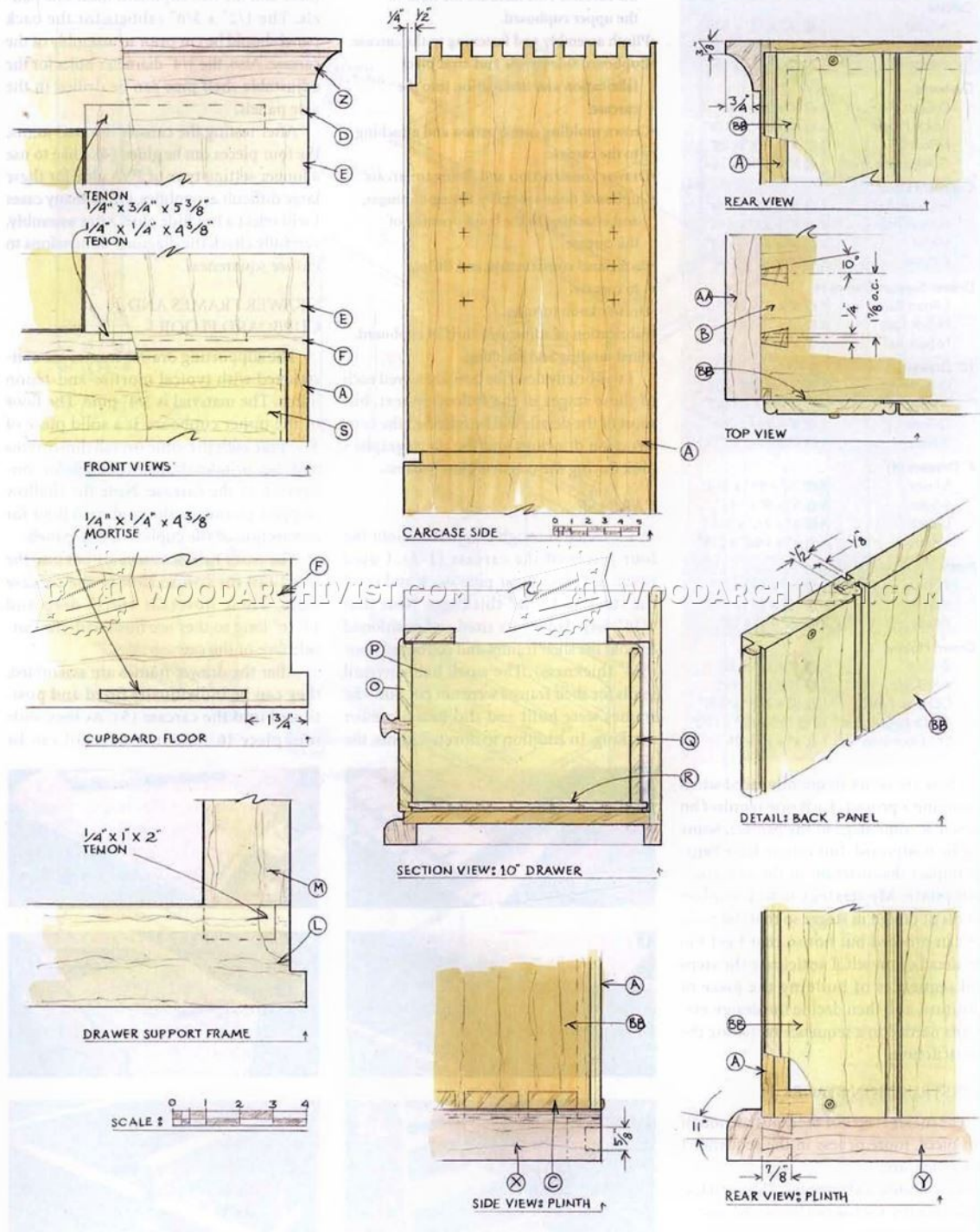
The supporting drawer frames are constructed with typical mortise-and-tenon joints. The material is 3/4" pine. The floor of the upper cupboard is a solid piece of 3/4" pine with the same overall dimensions and also includes the half-dovetails for connection to the carcase. Note the shallow stopped grooves in the cupboard floor for connection of the cupboard side panels.

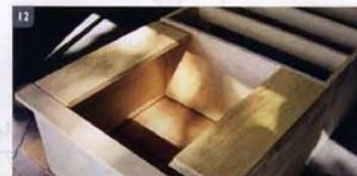
The small half-dovetails are cut into the front rail for connection to the carcase sides. These dovetails are 1" deep and 13/16" long so they are flush with the outside face of the carcase sides.

After the drawer frames are assembled, they can be individually fitted and positioned into the carcase (5). As they slide into place (6), the half dovetail can be



CARCASE DETAILS





marked for cutting on the carcass sides. After cutting the dovetail joints in the carcass, the drawer frames are ready for permanent installation. They should be glued to the carcass only in the front section (say, one third of the full width) so as not to cause a cross-grain expansion problem. The cupboard floor, on the other hand, should be glued the full width of the carcass since the grain is aligned with the case.

PLINTH

I chose to use a plinth foundation for the carcass, rather than risking a direct connection of the base molding to the bottom edge of the carcass. The plinth will provide a very rugged base without having a cross-grain issue with the molding. The plinth is constructed of four pieces connected in the corners with miters and dovetails as shown (7-9, drawing detail). The carcass simply rests within a shallow cutout in the plinth. Screws (with oversized shank holes for expansion) fasten the plinth to the bottom of the carcass sides (without glue).

CUPBOARD SIDE PANELS

The cupboard side panels have a 1/2" deep rabbet which fits over the carcass side. Glue and finish nails connect the side panel to the carcass side. Also, I used mortise-and-tenon joints to connect the side panel to the cabinet base and to the crest piece (10-12).

CREST PIECE

The crest piece fits into a cutout in the side panel (4). Most of this crest piece will eventually be covered by the crown molding. Glue and finish nails connect it to the carcass sides and top plate. The crest piece also has 1/4" mortises at each end to house the top tenons of the cupboard side panels.

DRAWERS

All drawers (four at 8" and one at 10" high) are fitted with hand-cut dovetails (13-15). There is a 1/4" thumbnail shape around the perimeter of the drawer front (17). Front and sides have a 1/4" groove for housing the drawer bottom. I used a solid bottom of 3/8" pine which has a beveled

edge for sliding into the drawer side grooves. The drawer sides and back are 5/8" thick. The drawer front is 13/16" thick.

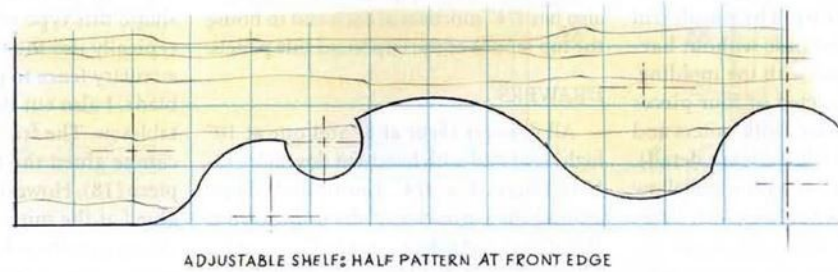
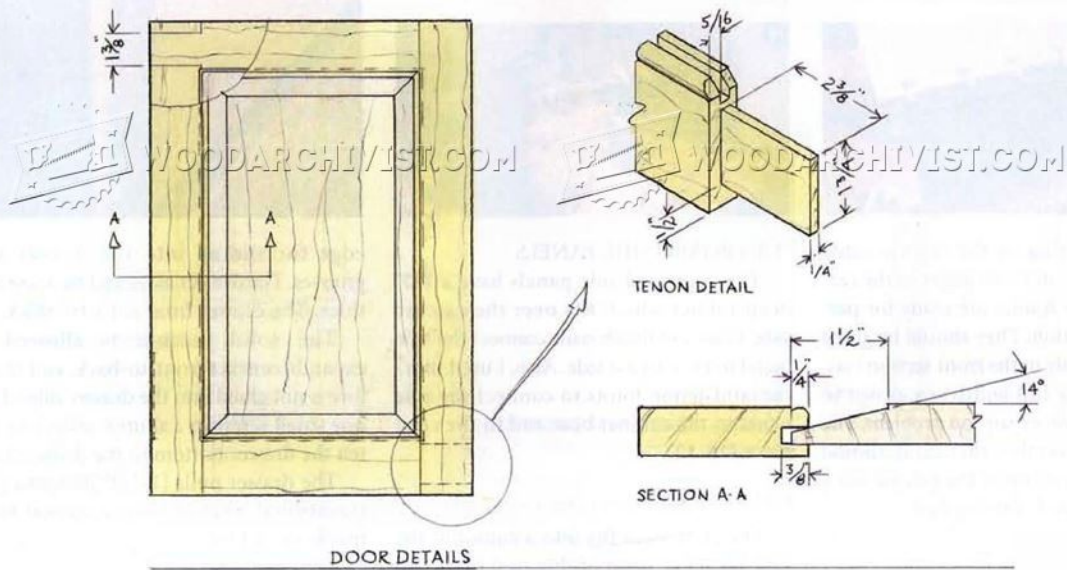
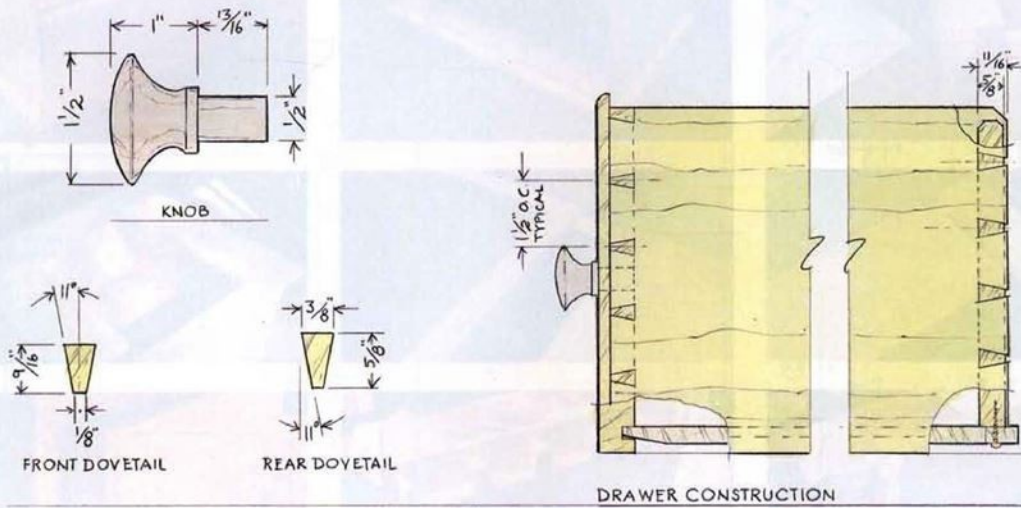
The solid bottom is allowed to expand/contract front-to-back, and therefore is not glued into the drawer sides. I use one small screw in a slotted groove to fasten the drawer bottom to the drawer back.

The drawer pulls (1-1/2" diameter) are traditional Shaker knobs turned from maple stock (16).

CROWN MOLDING

I fashioned the three pieces of the crown molding from 1" x 1-3/8" stock. To shape this type of large cove molding, I typically use the tablesaw with a skewed auxiliary fence to guide the stock over the blade. I also cut the miter corners on the tablesaw. The front piece of the molding can be glued the full length of the crest piece (18). However, side pieces should be glued at the miter joint and only a short distance on the side panel because of cross-grain issues. I tack the molding to the carcass with finish nails.

MISCELLANEOUS DETAILS





CUPBOARD DOOR

Typical mortise-and-tenon joints are used for the door frame (19). For strength, the rail tenons go all the way through the stiles. A 1/4" thumbnail molding is shaped on the inner perimeter surrounding the panel. Miter joints are carefully cut on these molding edges. The 1/4" grooves for housing the solid pine panel are 3/8" deep.

I like to use my bandsaw for cutting tenons. I use the tablesaw for beveling (14° angle) the door panel (20). The stile mortises are drilled from both sides with a conventional 1/4" drillbit. Then I square-up with a mortise chisel.

BACK PANEL

I chose a tongue-and-groove with 1/4" bead as the joinery for the solid back panel boards (21). This allows expansion/contraction across the grain. The back boards are 3/4" stock and random widths. The back panel sits in 3/8" x 1/2" rabbets in the carcass top and sides. I used standard wood screws to fasten the back to the carcass without glue.

CUPBOARD ADJUSTABLE SHELF

I added an adjustable shelf to the cupboard. I doubt that this was the case for the original Shaker piece. This cabinet may end up housing a flat panel TV or other electronic gear, and the flexibility will come in handy. I've also shaped the front of the adjustable shelf with a smooth scroll shape typical of other 18th-century corner cabinets that I have seen (24-26). Again, this was surely not done in the original piece. I used simple 1/4" diameter brass shelf pins for holding the shelf in place (25).

HARDWARE

For the cupboard door, I used Ball & Ball #H207-021 Bright 2" x 1-1/4" strong extruded brass butt hinges (22, 23). I added a simple wooden stop for the door, nailed inside the cupboard (27). I used a Ball & Ball #J51-593 Bright Brass 1-1/8" x 2-1/4" cupboard catch (28).

FINISH

After final sanding, I applied General Finishes "Gel Stain: New Pine," a light-col-

ored wipe-on urethane. This did not provide very much color, but partially sealed the grain of the pine and softened the look of the strong pine grain. Then I brushed on several coats of shellac made from Seedlac flakes diluted in alcohol. After sanding with 320-grit silicon carbide paper, I continued with a French polish procedure, using the same Seedlac flake mixture. As it turned out, the shellac coats provided most of the color, not the gel stain. I polished with 4/0 pumice and 4/0 steel wool in a slurry of linseed oil and mineral spirits.

As a final step, I rubbed paraffin wax onto the drawer sides and carcass to smooth the drawer movement.

After retiring from a 36-year career in the engineering and construction industry, Tim Killen has pursued a life-long interest in woodworking, particularly in reproducing 18th-century museum pieces. In this pursuit, he utilizes a spectrum of old and new technologies, from hand tools to 3D computer modeling. He lives in Orinda, California; his email address is tkillen@killenwood.com